CLASSIFICATION RESTRICTED
SECURITY INFORMATION
CENTRAL INTELLIGENCE AGENCY
INFORMATION FROM
FOREIGN DOCUMENTS OR RADIO BROADCASTS

REPORT
CD NO.

STAT

COUNTRY	USSR	DATE OF INFORMATION	1951
SUBJECT	Scientific - Electronics, battery receivers		
HOW PUBLISHED	Monthly periodical	DATE DIST.	28 Apr 1952
WHERE PUBLISHED	Moscow	NO. OF PAGES	5
DATE PUBLISHED	Mar 1951		
LANGUAGE	Russian	SUPPLEMENT TO REPORT NO.	

THIS IS UNEVALUATED INFORMATION

SOURCE Radio, No 3, 1951, pp 17-19.

PLAN SOVIET BATTERY RECEIVERS

/Figures referred to are appended./

(Russian Editors' Summary: In Radio, No 4, 1950, the editors began discussion of the nomenclature and technical and economical features of battery receivers being developed by the radio industry. These receivers use the new miniature tubes. The editors received many replies to this article; the more representative of these were published in Radio No 9 and 10, 1950, and No 1, 1951. All the letters emphasized the importance and timeliness of this discussion, and the opinions expressed in the letters are summarized and evaluated in this article.)

All letters received by the editors emphasized the need for increasing the number of types of battery receivers in the near future to at least three, including one receiver type each in classes II, III, and IV. However, some correspondents held that the main question is not so much a matter of wide choice as it is selection of one type of mass-produced, cheap, economical battery receiver.

Opinions varied greatly on the latter question. Some felt that this receiver should be a three-tube superheterodyne like the mass-produced Moskvich and ARZ-49 line receivers. Production of a similar battery receiver would involve the design of a new battery-operated miniature duo-diode-pentode with medium cutoff for operation in the reflex stage. With a receiver of this type, these correspondents think that there would be no need for simpler and cheaper receivers.

Many writers agreed with the contention of the first article, i.e., that the most suitable type of mass-produced battery receiver is a straight receiver employing an 0-V-1 circuit /Soviet designation for a two-tube receiver in which 0 means no rf amplification stage, V means vacuum-tube detector, and 1 means one af stage/ in which measures are taken to eliminate radiation from the antenna.

CLASSIFICATION RESTRICTED

STATE	X	NAVY	X	NSRB		DISTRIBUTION
ARMY	X	AIR	X	FBI		

STAT

Others felt that the 0-V-1 circuit should not be used. For local reception, some suggested the use of a crystal receiver with two af amplification stages. Others felt that the two tubes used in the 0-V-1 circuit should be employed in a 1-V-1 circuit or even, by introducing a contact detector, in a 2-K-2 reflex circuit. Because of their complex circuits and construction, these proposals are clearly unreasonable. Many Radio readers go even farther in attempting to simplify construction and suggest a crystal receiver with a carbon-powder amplifier.

The problem is extremely complicated. On the one hand, the receiver must be simple, cheap, and economical, since its popularity and its future requirements in batteries and tubes depend on these qualities. On the other hand, its qualitative features must be good, or at least better than those of a rural wired radio unit.

A wired radio installation with loud-speaker and yearly subscription fee costs about 250 rubles. A popular battery receiver with its supply unit should be cheaper. Since the total annual cost of the supply unit is about 70-100 rubles, the receiver should not cost more than 100-120 rubles.

While fulfilling the above requirements, it must ensure satisfactory reception of local and moderately distant stations with an outdoor antenna and must also be economical to operate. The first requirement is satisfied by the 0-V-1 or 0-V-2 circuits. In our opinion, operation is sufficiently economical if the filament drain is about 0.2 w (1.2 v and 180 ma, or 3 v and 60 ma) and the plate drain about 0.4 w (80 v and 5 ma). Total consumption at rated supply voltages would not be over 0.6 w and average consumption would be even less. The two-tube Tula and Riga B-912 straight [trf] receivers of the 0-V-1 type, now in production, have approximately these characteristics. These receivers, priced at less than 120 rubles, thus satisfy the basic requirements, but even they have defects which must be eliminated. The 0-V-1 may, however, be adopted as the best system for a mass-produced battery receiver.

Responses to the problem of the best type of higher class receiver, i.e., class III or II receivers, did not show such diversity of opinions. All correspondents agreed that three- or four-tube class III superheterodyne receivers should be manufactured, but some felt that production of such receivers would make it unnecessary to manufacture simpler and cheaper types like the Tula and B-912.

It is impossible to agree with this viewpoint because the difference in price is not so important as the question of economical operation and the related problem of the number of tubes and batteries needed to ensure continuous operation. The need for producing both three- and four-tube superheterodynes and simpler, cheaper, more economical battery receivers of the 0-V-1 type is obvious.

The Iskra, which is now in production, satisfies the requirements for a class III battery receiver. But more work must be done on reducing its nonlinear distortion. Moreover, an attachment should be furnished with each receiver so that it would not require a special battery. Most important of all, the Iskar should be equipped with a rheostat and a filament voltage indicator. Although the latter defect was pointed out in the first article and is understood by any radio amateur, industry has stubbornly refused to acknowledge it. Their position is that miniature battery tubes maintain their efficiency under filament voltage fluctuations from 1.45 to 0.95 v. According to commerical data, the voltage of the special dry battery made for the Iskra filament supply varies within these limits.

In view of this diversity of opinion, let us point out that the majority of writers agreed on the need for a filament rheostat. Only representatives of industry disagreed.

Let us now examine the curves of a cyclic (5 hours per day) discharge of dry cells of the 3S-MVD type (6S-MVD cells have similar discharge curves). Such conditions correspond to the actual operating conditions of a filament battery in a receiver.

Figure 1 shows the change of terminal voltage in these cells during one discharge cycle at rated current after varying periods of use. The curves A show the voltage supplied by the battery during the first days of service, B at the middle, and C at the end of its lifetime. To complete the picture, Figure 2 gives the curves for the initial and final terminal voltages in each discharge cycle of a 3S-MVD cell at rated current.

It is evident from these graphs that the battery voltage will vary only slightly, i.e., from 1.4 to 1.3 v, during the first hundred hours or approximately the first month of service. Hence, the miniature tubes in a receiver without a rheostat will be greatly overheated for a prolonged period. This greatly decreases tube life. In practice, the tubes in B-912 receivers burnt out after the first 10 days of receiver operation on new filament batteries of large capacity. A second set of tubes had to be put in to last until the end of the filament battery discharge. In other words, the owner must buy a new set of tubes when he buys a new set of batteries.

The Radiotekhnika Plant, which builds the Riga B-912, attempted to remedy this defect by introducing a voltage-dropping resistor in the circuit to keep the tubes from overheating at the beginning of operation. This fact is particularly indicative because the original models of the B-912 sent by the plant to IRPA (Institute of Radio Broadcasting, Reception, and Acoustics) had rheostats as well as very simple indicators for filament voltage. But before approval, on the recommendation of the IRPA, both of these were removed on the grounds that the characteristics of miniature tubes were better.

A different method of filament voltage control was used in the Tula receiver. The 1B1P and 2P1P filaments were connected in series. The receiver is supplied by two cells connected in series, which produce an initial voltage of about 3 v. After the battery voltage drops to 2-2.5 v, one half of the 2P1P filament is disconnected from the series circuit. The rated voltage for the filaments is then 2.4 v. As seen from Figure 2, the cell voltage drops below 1.25 v after about one quarter of its lifetime. Consequently, the simple switching provided in the Tula ensures normal filament operating conditions for the tubes on the one hand and, on the other, permits complete utilization of the filament battery capacity, since the receiver maintains its efficiency even when 1.6 v is applied to the 2 v terminals (a voltage of 0.8 v, per cell, as seen in Figure 2, means full utilization of its capacity).

Hence, in a simple straight receiver, a voltage-dropping resistor or a switching of the tube filaments can, to some extent, replace a filament rheostat. But in a superheterodyne receiver, such as the Iskra, a rheostat and a filament voltage indicator are needed because a drop in the battery voltage results in faulty operation of the oscillator. It is time to realize that the small cost of a rheostat and filament voltage indicator (not over 10-20 rubles) pays for itself a hundredfold in the operation of the receiver by increasing tube life and providing better utilization of the filament battery capacity.

STAT

All our correspondents agreed that a class II battery receiver with miniature tubes on the order of the Rodina must be manufactured. This receiver should be designed for collective use. Its output power should be about 0.15-0.3 w.

The following suggestions for its design are put forward for discussion.

First, the receiver should have a rheostat and a simple filament voltage indicator. Second, the receiver should have an "economy switch" for reducing consumption during reception of local stations, e. g., by disconnecting part of the tubes or half of the output tube filament. Thirdly, the receiver should be provided with jacks for a sound pickup and an additional loudspeaker.

Finally, all correspondents agreed upon the need for the production of at least one type of portable battery receiver and power packs for it.

Amateur radio designers can do much toward the development of receivers of all types, especially class II and class III receivers. Undoubtedly, many of the battery receivers of various classes which will be shown at the Ninth All-Union Exhibition will satisfy the requirements brought out in this discussion. These receivers [illegible] serve as prototypes for the development of corresponding commercial receivers.

[Appended figures follow.]

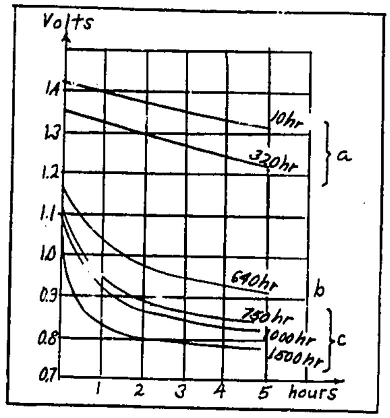

Figure 1. Variation in the Terminal Voltage of a 3S-MVD Cell During One Discharge Cycle.

Figures on curves show number of hours of operation before discharge cycle began.

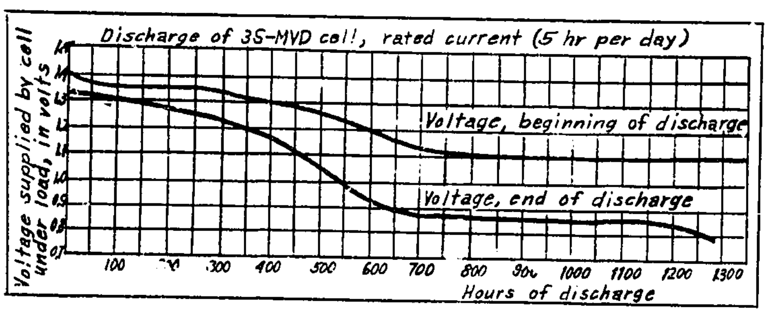

Figure 2. Variations in Initial and Final 3S-MVD Cell Voltage During Discharge

- E N D -